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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 7879-3 (1975): Glossary of Aeronautical and Astronautical Terms, Part III: Structure [TED 14: Aircraft and Space Vehicles]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard (Reaffirmed 2005)

GLOSSARY OF AERONAUTICAL AND ASTRONAUTICAL TERMS

PART III STRUCTURE

0. Foreword

0.1 Provides standard definitions of technical terms peculiar to aeronautics, astronautics and related subjects. Terms in general use in other branches of engineering are also included where they have some special relevance to aeronautics or astronautics.

0.2 This standard consists of a series of parts, each part covering terms specific to a particular feature, type of aircraft, equipment, service, etc.

0.3 The general arrangement of the terms is alphabetical. However, in certain cases, related terms have been given together under a heading or general definition, and these are printed in distinctive italic type.

0.4 Each term has been assigned a 4-digit or 5-digit number. The first one (or two) digit, in the thousandth place, represents the part number. This part number with the following digit in the hundredth place represents the section. The last two digits represent the position of the definition within a section. Thus the term 3405 is the 5th definition of Section 34, which is in Part III.

0.5 Where two or more synonymous terms are in use, the term which is favoured is given first, with the intention that it should gradually displace the others. The alternative terms are given below the preferred terms in less prominent type.

0.6 An Indian Standard Glossary of space terms covering definitions pertaining to rockets, missiles, etc. is also under preparation.

0.7 Assistance has been derived from BS 185 'Aeronautical and astronautical terms' issued by the British Standards Institution, in the preparation of this series of Indian Standards.

1. Scope — This part covers the standard definitions for terms relating to the structures of an aircraft.

2. Terminology

SECTION 31 — GENERAL

No.	Term	Definition
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3102	<i>Creep Buckling</i>	Critical terminal buckling resulting from slow and steady increase in the deformation of a structure under a constant load.
3103	<i>Thermal Buckling</i>	Buckling induced wholly or in part by thermal stress or by thermal distortion.
3104	Factor of Safety	The factor by which a limit load is multiplied to produce the load to be used in the design of an aircraft or part of an aircraft. It is introduced to provide a margin of strength against loads greater than the limit loads, and against uncertainties in materials, construction, load estimation and stress analysis.
3105	<i>Proof Factor</i>	The factor of safety corresponding to the proof load.

Adopted 25 November 1975

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NEW DELHI 110002

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No.	Term	Definition
3106	Ultimate Factor	The factor of safety corresponding to the load which is regarded as the ultimate for design purposes, that is, the fully-factored load.
3107	Finesness Ratio	The ratio of the length of a body to its maximum transverse dimension or, sometimes, to some equivalent dimension.
3108	Flexural Centre	Flexural centre of a cross-section is defined as a point in that section at which a shear force can be applied without producing a rotation of that section in its own plane.
3109	Flight Envelope MANOEUVRING V-n DIAGRAM	A diagram in which, for a particular aircraft type, the specified design normal accelerations (as multiples of <i>g</i>) form the ordinates and the corresponding equivalent airspeeds the abscissae. The boundary of the diagram forms a closed figure which defines the design limits for the aircraft concerned.
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3111	Geodetic Construction	A method of making curved space frames in which the principal structural members follow geodesics in the surface, so that the forces set up in the members are either tensile or compressive.
3112	Gust Alleviation Factor ALLEVIATION FACTOR	A correction factor which allows for gust shape, aircraft flexibility, freedom in pitch and delay in the growth of the lift increment. The factor is applied to the increment in acceleration found from a simple calculation of the response to a sharp-edged gust in which no allowance is made for these effects.
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3114	Gust Frequency	The number of discrete gusts encountered per unit horizontal distance (usually one mile) having vertical velocity equal to or greater than a given value.
3115	Integral Construction	The formation of a structural member as a single whole instead of by the assembly of a large number of separate elements.
3116	Limit Load UNFACTORED LOAD	The maximum load expected to be applied, in a particular condition of operation, to the aircraft or to any part of it.
3117	Load Diffusion	The process by which variation along any length of a structure of transverse distribution of stress, due to direct loads applied in the direction of that length, is established.
3118	Shear Lag	The type of load diffusion in which the lag of longitudinal displacement of one part of a transverse section relative to that of another results primarily from shear loading applied along lines parallel to the length of the structure.
3119	Load Factor	The ratio of the total load in a specified direction (usually along the normal axis) to the weight of the aircraft. Such load may arise from the aerodynamic forces, gravity, ground or water reaction, or from combinations of these forces.
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3125	<i>Rosette</i>	A set of strain gauges at a point on the surface of a structure, so arranged that the state of plane strain at the point can be fully determined.
3126	<i>Wire Strain Gauge</i>	A common form of strain gauge in which the sensing element comprises one or more lengths of fine wire, the change in whose electrical resistance under load provides a measure of the strain.
3127	Stressed-Skin Structure	A structure covered with sheet which contributes substantially to its strength and stiffness.
3128	Temperature Stress	A stress induced when a structure embodying materials with different coefficients of linear expansion is exposed to a temperature other than that prevailing at the time of assembly.
3129	Test Frame	An apparatus for subjecting aircraft structures to loads representing those occurring in operation. It comprises loading and supporting frameworks and a control mechanism for the application of loads by hydraulic jacks or other means.
3130	Thermal Stress TEMPERATURE GRADIENT STRESS	The stress induced within a structure by changes in temperature.
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SECTION 32 — DETAIL PARTS

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3202	Boat-Tail	The rear portion of an elongated body, as a rocket, having cross-sectional area decreasing toward the rear.
3203	Bulkhead	A transverse dividing wall within a structure.
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3206	DV Window (Panel)	A quick-opening cockpit window (panel) allowing direct vision.
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No.	Term	Definition
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3211	Former	A structural member, the primary purpose of which is to preserve form or shape and to which the external skin is attached. In general, it carries structural loads.
3212	Frame	a) Generally, a plane structure transverse to the axis of a tube and maintaining the shape of the cross section of the tube. b) Specifically, a structural member lying in a transverse plane of a fuselage, hull or nacelle, and following the periphery.
3213	<i>Spar Frame</i>	A specially strong frame in the plane of any spar.
3214	Keelson	A longitudinal member forming part of the main structure of a hull or float and running internally along the bottom.
3215	Longeron	A main longitudinal member of a fuselage or nacelle.
3216	Monocoque	A type of structure whose strength and rigidity depends upon the outer surface, usually with strong circumferential members.
3217	Panel	A portion of a stiffened sheet together with its stiffeners.
3218	Plate	a) In structural theory, a portion of an unstiffened sheet. b) A sheet having thickness greater than a specified amount.
3219	Rib	A member which maintains the required contour of the covering material of planes or control surfaces, and which may also act as a structural member.
3220	<i>Nose Rib</i>	A former between the front spar and leading edge of an aerofoil.
3221	Rudder Post	The principal structural member of a rudder, usually carrying the hinges (see 3231).
3222	Sandwich	A structural component consisting of two parallel, or nearly parallel, faces attached to either side of a core of material of different properties.
3223	Core	The material between the faces of a sandwich. It stabilizes them and may carry direct load.
3224	<i>Corrugated Sandwich</i>	A sandwich in which the core is built up from sheet having longitudinal corrugations, enabling it to carry direct load in the longitudinal direction.
3225	<i>Faces</i>	The external skins of a sandwich.
3226	<i>Honeycomb Sandwich</i>	A sandwich in which the core is formed of thin-walled small cells, often, but not necessarily, hexagonal in shape. It is usual to assume that the core will carry negligible direct load parallel to the faces.
3227	Sheet	Material of which the thickness is small in comparison with the other dimensions.
3228	Shell	A curved structure formed of sheet (either stiffened or unstiffened) generally closed on itself as in a tube.
3229	Skin	Sheet covering a framework of stiffeners.
3230	Spar	A principal spanwise structural member of an aerofoil or control surface.
3231	Stern Post	A single member terminating a fuselage, hull or float (see 3221).

No.	Term	Definition
3232	Stiffener	A member attached to a sheet to restrain its movement normal to the surface.
3233	Stringer	A stiffener which also assists the sheet to carry direct load in the direction of its length.
3234	Strut	A structural member intended to resist compression.
3235	Drag Struts	Struts incorporated in the framework of an aerofoil to carry the loads induced by the air forces in the plane of the aerofoil.
3236	Interplane Struts	Struts connecting a plane to the plane above or below.
3237	Wires <i>Anti-drag Wires</i>	Wires or cables incorporated in the framework of an aerofoil and in its plane, complementary to the drag wires and resisting forces in the opposite direction.
3238	<i>Anti-lift Wires</i> LANDING WIRES	Wires to resist forces in the opposite direction to the lift.
3239	Drag Wires	Wires or cables incorporated in the framework of an aerofoil and in its plane, to resist forces in the general direction of the drag.
3240	Incidence Wires	Wires or cables bracing the main plane structure in the plane of a pair of front and rear struts.
3241	<i>Lift Wires</i> FLYING WIRES	Wires or cables the principal function of which is to transfer the lift of the main planes to the main structure.
3242	Streamline Wire	A wire the cross section of which is elongated to reduce its drag.

SECTION 33 — AEROELASTICITY

3301	Aeroelastic Divergence	The aeroelastic instability which results when the rate of change of aerodynamic forces or couples with displacement exceeds that of the elastic restoring forces or couples.
3302	Divergence Speed	The lowest equivalent air speed at which aeroelastic divergence occurs.
3303	Aeroelasticity	A branch of mechanics which treats of the phenomena resulting from the interaction of aerodynamic, inertial and elastic forces.
3304	Aerothermoelasticity	That branch of aeroelasticity in which aerodynamic heating of the structure is considered.
3305	Aileron Buzz CONTROL SURFACE BUZZ	An oscillation, of limited amplitude, of a control surface about its hinge. It can occur at high subsonic and transonic speeds.
3306	Buffeting	An irregular oscillation of any part of an aircraft produced and maintained directly by an eddying flow.
3307	Damping <i>Material Damping</i>	The damping intrinsic to the material of the structure.
3308	Structural Damping	The total damping of a built-up structure.
3309	Flight Flutter Test	A flight test during which the structure of an aircraft is excited in order to observe its behaviour and to deduce its flutter characteristics.
3310	Flutter	A sustained oscillation due to the interaction between aerodynamic forces, elastic reactions and inertia.

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No.	Term	Definition
3311	<i>Anti-symmetrical Flutter</i>	Flutter in which the components on port and starboard sides of an aircraft undergo, at any instant, equal but asymmetrical displacement with respect to the plane of symmetry.
3312	<i>Asymmetrical Flutter</i>	Flutter in which the components on the port and starboard sides of an aircraft undergo, at any instant, asymmetrical and unequal displacements with respect to the plane of symmetry.
3313	<i>Classical Flutter</i> COUPLED FLUTTER	Flutter which occurs because of coupling (inertial, aerodynamic or elastic) between two or more degrees of freedom.
3314	<i>Flutter Speed</i>	The lowest equivalent airspeed at which flutter occurs.
3315	<i>Stalling Flutter</i>	Flutter in one or more degrees of freedom around the angle of stall.
3316	<i>Symmetrical Flutter</i>	Flutter in which the components on the port and starboard sides of an aircraft undergo, at any instant, equal and symmetrical displacements with respect to the plane of symmetry.
3317	Frequency Parameter REDUCED FREQUENCY	The ratio of the product of the frequency of an oscillation and a representative length of an oscillating system to the true airspeed.
3318	Mass-Balance Weight	A mass normally attached to a control surface forward of the hinge line, for the purpose of reducing or eliminating the inertial coupling between angular movement of the control and some other degree of freedom of the aircraft.
3319	<i>Distributed Mass-Balance Weight</i>	A mass-balance weight which is distributed along the span of the control surface.
3320	<i>Remote Mass-Balance Weight</i>	A mass-balance weight which is connected to the control surface by a series of links.
3321	Normal Mode of Vibration	A mode of free vibration of an undamped system.
3322	Reference Section	A section of a structure, the displacements of which are taken as the co-ordinates in a semi-rigid representation.
3323	Resonance Test SHAKE TEST	A test in which forced oscillation over a range of frequencies is applied to a structure with the object of determining the natural frequencies and modes of oscillation of the structure.
3324	Reversal of Control	The condition in which the displacement of a control surface produces a moment on the aircraft in a reverse sense because of excessive structural distortion.
3325	Reversal Speed	The lowest equivalent airspeed at which reversal of control occurs.
3326	Semi-rigid Theory	An approximate theory of elastic structures in which the theoretical infinite number of degrees of freedom is represented by a finite number, each being associated with an invariable mode.
3327	Static Balance	The condition of a control surface in which the mass-balance is such that the centre of mass lies on the hinge axis.
3328	Stiffness Criterion	A relationship between the stiffness and other properties of a structure which, when satisfied, is sufficient to prevent flutter or other type of instability or loss of control.
3329	Virtual Inertia (Mass)	That part of the effective inertia (mass) of an oscillating body which is due to the presence of the surrounding air and is proportional to the density of that air.

SECTION 34 — FATIGUE

No.	Term	Definition
3401	Acoustic Fatigue	Fatigue due to repeated loading produced by sound waves.
3402	Acoustic Fatigue Test	A test in which a specimen is subjected to acoustic loading in a test channel or reverberant chamber, or in the open.
3403	<i>Discrete Frequency Test</i>	A test in which the specimen is subjected to sound waves of only one frequency.
3404	<i>Random Frequency Test</i>	A test in which the specimen is subjected simultaneously to sound waves covering a broad band of frequencies.
3405	Endurance	The number of stress cycles to failure at a constant amplitude and constant mean stress, preferably given as a fraction or multiple of 10^6 cycles. In programme loading, endurance may be expressed as the number of programmes to failure.
3406	Fail-Safe Structure	A structure which retains, after the initiation of a fracture or crack, sufficient strength and stiffness for the operation of the aircraft with an acceptable standard of safety until such fracture or crack is detected by normal inspection procedure.
3407	Fatigue Life	The operational life of an aircraft or component, expressed as a number of flying hours or flights or of applications of load during which the general level of structural safety is not appreciably lowered by fatigue.
3408	Fatigue Limit	The highest level of alternating stress for a given mean stress at which the endurance is infinite.
3409	Fatigue Strength	The alternating stress at a specified mean stress which causes failure at a given number of cycles.
3410	Fatigue Strength Reduction Factor	The ratio of the fatigue strength of a plain specimen to that of a similar specimen with a stress concentration, under the same external loads.
3411	Fatigue Test Tank	A water tank, with the necessary ancillary equipment, in which a scaled body (for example, the pressure cabin of an aircraft) is wholly immersed and subjected to cyclic variations of internal water pressure. Provision may also be made for the simultaneous imposition of cyclic loading to the remainder of the aircraft.
3412	Fluctuating Load Cycles <i>Repeated Load Cycle</i>	A load cycle in which the load does not change sign, usually with zero minimum load.
3413	<i>Reversed Load Cycle</i>	A load cycle with zero mean load.
3414	Geometric Stress Concentration Factor	That which arises solely from the shape of the part, as derived from elastic theory or from strain measurements during which the material remains elastic throughout.
3415	Loads <i>Mean Load</i>	The average of the algebraic values of the maximum and minimum loads of the fatigue loading cycle.
3416	<i>Alternating Load</i>	The excursion from the mean load.
3417	<i>Range of Load</i>	The difference between maximum and minimum loads.
3418	<i>Load Ratio</i>	The ratio of the minimum to the maximum load.

No.	Term	Definition
3418	Near Field	The region in the vicinity of a noise source in which the fluid particle velocity is not necessarily in the direction of travel of the wave, and an appreciable tangential velocity may exist at any point. In this region the acoustic intensity is not simply related to the sound pressure squared.
3420	Programme Loading	A set of predetermined loads, applied in a definite order and repeated until failure or for a specified number of times.
3421	Random Loading	A random sequence of loads defined by a continuous spectrum of known statistical properties.
3422	Randomized Loading	A set of predetermined loads, applied repeatedly, each time in random order until failure or for the required number of times.
3423	S-N Diagram	A diagram in which the logarithm of endurance is plotted, as abscissa, against the alternating stress (semi-log plot) or its logarithm (log-log plot), as ordinate.
3424	Safe Life	That life during which the probability of fatigue failure is below a specified low level.
3425	Semi-range/Mean Stress Diagram	A diagram in which contours of constant endurance are plotted with alternating stress as ordinate and mean stress as abscissa.
3426	Shock Cell Noise	A phenomenon which may occur in the efflux of a jet engine with certain nozzle configurations and super-critical pressure ratios. It can give rise to high sound intensities contained within a relatively small bandwidth.
3427	Spectral Density	The mean square value of the quantity in a band one cycle per second wide, centred at a specified frequency.
3428	Narrow Band Loading	Sinusoidal loading of constant spectral density over a bandwidth appreciably less than one octave.
3429	Wide Band Loading	Sinusoidal loading of constant spectral density over a bandwidth greater than one octave.
3430	Strain Concentration Factor	The ratio of the highest strain to a reference strain calculable from simple theory.
3431	Stress Concentration	A local increase in the intensity of a stress field in a region surrounding a discontinuity. The discontinuity may be one of shape (for example, hole, notch, crack, surface defect), metallurgical origin (for example, inclusion) or local distribution of load (for example, pin-joint).
3432	Stress Concentration Factor	The ratio of the highest stress to a reference stress calculable from simple theory.
3433	Mean Stress	The average of the algebraic values of the maximum and minimum stresses of the fatigue loading cycle.
3434	Alternating Stress	The excursion from the mean stress.
3435	Range of Stress	The difference between maximum and minimum stresses.
3436	Stress Ratio	The ratio of the minimum to the maximum stress.
3437	Thermal Fatigue	Fatigue produced by fluctuations of temperature.
3438	Ultrasonic	In acoustics, pertaining to frequencies above those detectable by the human ear, often taken as higher than 20 000 vibrations per second.

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3210	Fin Post	The principal structural member of a fin, usually carrying the rudder.
3211	Former	A structural member, the primary purpose of which is to preserve form or shape and to which the external skin is attached. In general, it carries structural loads.
3212	Frame	a) Generally, a plane structure transverse to the axis of a tube and maintaining the shape of the cross section of the tube. b) Specifically, a structural member lying in a transverse plane of a fuselage, hull or nacelle, and following the periphery.
3218	Spar Frame	A specially strong frame in the plane of any spar.
3214	Keelson	A longitudinal member forming part of the main structure of a hull or float and running internally along the bottom.
3215	Longeron	A main longitudinal member of a fuselage or nacelle.
3216	Monocoque	A type of structure whose strength and rigidity depends upon the outer surface, usually with strong circumferential members.
3217	Panel	A portion of a stiffened sheet together with its stiffeners.
3218	Plate	a) In structural theory, a portion of an unstiffened sheet. b) A sheet having thickness greater than a specified amount.
3219	Rib	A member which maintains the required contour of the covering material of planes or control surfaces, and which may also act as a structural member.
3220	Nose Rib	A former between the front spar and leading edge of an aerofoil.
3221	Rudder Post	The principal structural member of a rudder, usually carrying the hinges (see 3231).
3222	Sandwich	A structural component consisting of two parallel, or nearly parallel, faces attached to either side of a core of material of different properties.
3223	Core	The material between the faces of a sandwich. It stabilizes them and may carry direct load.
3224	Corrugated Sandwich	A sandwich in which the core is built up from sheet having longitudinal corrugations, enabling it to carry direct load in the longitudinal direction.
3225	Faces	The external skins of a sandwich.
3226	Honeycomb Sandwich	A sandwich in which the core is formed of thin-walled small cells, often, but not necessarily, hexagonal in shape. It is usual to assume that the core will carry negligible direct load parallel to the faces.
3227	Sheet	Material of which the thickness is small in comparison with the other dimensions.
3228	Shell	A curved structure formed of sheet (either stiffened or unstiffened) generally closed on itself as in a tube.
3229	Skin	Sheet covering a framework of stiffeners.
3230	Spar	A principal spanwise structural member of an aerofoil or control surface.
3231	Stern Post	A single member terminating a fuselage, hull or float (see 3221).

No.	Term	Definition
3232	Stiffener	A member attached to a sheet to restrain its movement normal to the surface.
3233	Stringer	A stiffener which also assists the sheet to carry direct load in the direction of its length.
3234	Strut	A structural member intended to resist compression.
3235	<i>Drag Struts</i>	Struts incorporated in the framework of an aerofoil to carry the loads induced by the air forces in the plane of the aerofoil.
3236	<i>Interplane Struts</i>	Struts connecting a plane to the plane above or below.
3237	Wires <i>Anti-drag Wires</i>	Wires or cables incorporated in the framework of an aerofoil and in its plane, complementary to the drag wires and resisting forces in the opposite direction.
3238	<i>Anti-lift Wires</i> LANDING WIRES	Wires to resist forces in the opposite direction to the lift.
3239	<i>Drag Wires</i>	Wires or cables incorporated in the framework of an aerofoil and in its plane, to resist forces in the general direction of the drag.
3240	<i>Incidence Wires</i>	Wires or cables bracing the main plane structure in the plane of a pair of front and rear struts.
3241	<i>Lift Wires</i> FLYING WIRES	Wires or cables the principal function of which is to transfer the lift of the main planes to the main structure.
3242	<i>Streamline Wire</i>	A wire the cross section of which is elongated to reduce its drag.

SECTION 33 — AEROELASTICITY

3301	Aeroelastic Divergence	The aeroelastic instability which results when the rate of change of aerodynamic forces or couples with displacement exceeds that of the elastic restoring forces or couples.
3302	<i>Divergence Speed</i>	The lowest equivalent air speed at which aeroelastic divergence occurs.
3303	Aeroelasticity	A branch of mechanics which treats of the phenomena resulting from the interaction of aerodynamic, inertial and elastic forces.
3304	Aerothermoelasticity	That branch of aeroelasticity in which aerodynamic heating of the structure is considered.
3305	Aileron Buzz CONTROL SURFACE BUZZ	An oscillation, of limited amplitude, of a control surface about its hinge. It can occur at high subsonic and transonic speeds.
3306	Buffeting	An irregular oscillation of any part of an aircraft produced and maintained directly by an eddying flow.
3307	Damping <i>Material Damping</i>	The damping intrinsic to the material of the structure.
3308	<i>Structural Damping</i>	The total damping of a built-up structure.
3309	Flight Flutter Test	A flight test during which the structure of an aircraft is excited in order to observe its behaviour and to deduce its flutter characteristics.
3310	Flutter	A sustained oscillation due to the interaction between aerodynamic forces, elastic reactions and inertia.

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No.	Term	Definition
3311	Anti-symmetrical Flutter	Flutter in which the components on port and starboard sides of an aircraft undergo, at any instant, equal but asymmetrical displacement with respect to the plane of symmetry.
3312	Asymmetrical Flutter	Flutter in which the components on the port and starboard sides of an aircraft undergo, at any instant, asymmetrical and unequal displacements with respect to the plane of symmetry.
3313	Classical Flutter COUPLED FLUTTER	Flutter which occurs because of coupling (inertial, aerodynamic or elastic) between two or more degrees of freedom.
3314	Flutter Speed	The lowest equivalent airspeed at which flutter occurs.
3315	Stalling Flutter	Flutter in one or more degrees of freedom around the angle of stall.
3316	Symmetrical Flutter	Flutter in which the components on the port and starboard sides of an aircraft undergo, at any instant, equal and symmetrical displacements with respect to the plane of symmetry.
3317	Frequency Parameter REDUCED FREQUENCY	The ratio of the product of the frequency of an oscillation and a representative length of an oscillating system to the true airspeed.
3318	Mass-Balance Weight	A mass normally attached to a control surface forward of the hinge line, for the purpose of reducing or eliminating the inertial coupling between angular movement of the control and some other degree of freedom of the aircraft.
3319	Distributed Mass-Balance Weight	A mass-balance weight which is distributed along the span of the control surface.
3320	Remote Mass-Balance Weight	A mass-balance weight which is connected to the control surface by a series of links.
3321	Normal Mode of Vibration	A mode of free vibration of an undamped system.
3322	Reference Section	A section of a structure, the displacements of which are taken as the co-ordinates in a semi-rigid representation.
3323	Resonance Test SHAKE TEST	A test in which forced oscillation over a range of frequencies is applied to a structure with the object of determining the natural frequencies and modes of oscillation of the structure.
3324	Reversal of Control	The condition in which the displacement of a control surface produces a moment on the aircraft in a reverse sense because of excessive structural distortion.
3325	Reversal Speed	The lowest equivalent airspeed at which reversal of control occurs.
3326	Semi-rigid Theory	An approximate theory of elastic structures in which the theoretical infinite number of degrees of freedom is represented by a finite number, each being associated with an invariable mode.
3327	Static Balance	The condition of a control surface in which the mass-balance is such that the centre of mass lies on the hinge axis.
3328	Stiffness Criterion	A relationship between the stiffness and other properties of a structure which, when satisfied, is sufficient to prevent flutter or other type of instability or loss of control.
3329	Virtual Inertia (Mass)	That part of the effective inertia (mass) of an oscillating body which is due to the presence of the surrounding air and is proportional to the density of that air.

SECTION 34 — FATIGUE

No.	Term	Definition
3401	Acoustic Fatigue	Fatigue due to repeated loading produced by sound waves.
3402	Acoustic Fatigue Test	A test in which a specimen is subjected to acoustic loading in a test channel or reverberant chamber, or in the open.
3403	<i>Discrete Frequency Test</i>	A test in which the specimen is subjected to sound waves of only one frequency.
3404	<i>Random Frequency Test</i>	A test in which the specimen is subjected simultaneously to sound waves covering a broad band of frequencies.
3405	Endurance	The number of stress cycles to failure at a constant amplitude and constant mean stress, preferably given as a fraction or multiple of 10^6 cycles. In programme loading, endurance may be expressed as the number of programmes to failure.
3406	Fail-Safe Structure	A structure which retains, after the initiation of a fracture or crack, sufficient strength and stiffness for the operation of the aircraft with an acceptable standard of safety until such fracture or crack is detected by normal inspection procedure.
3407	Fatigue Life	The operational life of an aircraft or component, expressed as a number of flying hours or flights or of applications of load during which the general level of structural safety is not appreciably lowered by fatigue.
3408	Fatigue Limit	The highest level of alternating stress for a given mean stress at which the endurance is infinite.
3409	Fatigue Strength	The alternating stress at a specified mean stress which causes failure at a given number of cycles.
3410	Fatigue Strength Reduction Factor	The ratio of the fatigue strength of a plain specimen to that of a similar specimen with a stress concentration, under the same external loads.
3411	Fatigue Test Tank	A water tank, with the necessary ancillary equipment, in which a scaled body (for example, the pressure cabin of an aircraft) is wholly immersed and subjected to cyclic variations of internal water pressure. Provision may also be made for the simultaneous imposition of cyclic loading to the remainder of the aircraft.
3412	Fluctuating Load Cycles <i>Repeated Load Cycle</i>	A load cycle in which the load does not change sign, usually with zero minimum load.
3413	<i>Reversed Load Cycle</i>	A load cycle with zero mean load.
3414	Geometric Stress Concentration Factor	That which arises solely from the shape of the part, as derived from elastic theory or from strain measurements during which the material remains elastic throughout.
3415	Loads <i>Mean Load</i>	The average of the algebraic values of the maximum and minimum loads of the fatigue loading cycle.
3416	<i>Alternating Load</i>	The excursion from the mean load.
3417	<i>Range of Load</i>	The difference between maximum and minimum loads.
3418	<i>Load Ratio</i>	The ratio of the minimum to the maximum load.

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No.	Term	Definition
3419	Near Field	The region in the vicinity of a noise source in which the fluid particle velocity is not necessarily in the direction of travel of the wave, and an appreciable tangential velocity may exist at any point. In this region the acoustic intensity is not simply related to the sound pressure squared.
3420	Programme Loading	A set of predetermined loads, applied in a definite order and repeated until failure or for a specified number of times.
3421	Random Loading	A random sequence of loads defined by a continuous spectrum of known statistical properties.
3422	Randomized Loading	A set of predetermined loads, applied repeatedly, each time in random order until failure or for the required number of times.
3423	S-N Diagram	A diagram in which the logarithm of endurance is plotted, as abscissa, against the alternating stress (semi-log plot) or its logarithm (log-log plot), as ordinate.
3424	Safe Life	That life during which the probability of fatigue failure is below a specified low level.
3425	Semi-range/Mean Stress Diagram	A diagram in which contours of constant endurance are plotted with alternating stress as ordinate and mean stress as abscissa.
3426	Shock Cell Noise	A phenomenon which may occur in the efflux of a jet engine with certain nozzle configurations and super-critical pressure ratios. It can give rise to high sound intensities contained within a relatively small bandwidth.
3427	Spectral Density	The mean square value of the quantity in a band one cycle per second wide, centred at a specified frequency.
3428	Narrow Band Loading	Sinusoidal loading of constant spectral density over a bandwidth appreciably less than one octave.
3429	Wide Band Loading	Sinusoidal loading of constant spectral density over a bandwidth greater than one octave.
3430	Strain Concentration Factor	The ratio of the highest strain to a reference strain calculable from simple theory.
3431	Stress Concentration	A local increase in the intensity of a stress field in a region surrounding a discontinuity. The discontinuity may be one of shape (for example, hole, notch, crack, surface defect), metallurgical origin (for example, inclusion) or local distribution of load (for example, pin-joint).
3432	Stress Concentration Factor	The ratio of the highest stress to a reference stress calculable from simple theory.
3433	Mean Stress	The average of the algebraic values of the maximum and minimum stresses of the fatigue loading cycle.
3434	Alternating Stress	The excursion from the mean stress.
3435	Range of Stress	The difference between maximum and minimum stresses.
3436	Stress Ratio	The ratio of the minimum to the maximum stress.
3437	Thermal Fatigue	Fatigue produced by fluctuations of temperature.
3438	Ultrasonic	In acoustics, pertaining to frequencies above those detectable by the human ear, often taken as higher than 20 000 vibrations per second.